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NOTES

JEFFREY ROGER SUNDBERG

A note on the importance of developing digital facsimiles and a digital register of Javanese inscriptions

There are many regrets to be entertained over the treatment of the inscriptions of Java. Many inscriptions are well preserved and relatively accessible to the public in the courtyard of the National Museum in Jakarta, but there are many others that suffer from poor documentation, especially at the hands of their most prominent epigraphers. De Casparis (1976:177-8), in his review of Sarkar's *Corpus of the inscriptions of Java* (1971-72), was led to complain that 'The present work [...] contains no facsimiles or other reproductions of inscriptions and gives no full references to photographs, estampages, and other materials. A serious shortcoming of this publication is the fact that the author himself does not appear to have utilized such materials in Jakarta or Leiden to test the correctness of the transcriptions prepared more than half a century ago.' Damais (1968:302) levelled the selfsame charge against De Casparis: 'One will deplore again the total lack of reproductions, photographic or otherwise, that is far more to be regretted in that it concerns a part of the most ancient epigraphical documents in Java and Sumatra, of which very few reproductions are accessible to the public'. This general complaint arises with the documentation of the work of a substantial number of Central Java's epigraphers: of all of the scholars who have provided primary readings of Javanese inscriptions, the only ones whose work we can be certain of are Karto-Atmodjo, Oemar, Setianingsih, and Suhadi, as they consistently included at least hand-drawn facsimiles and often photographs, which served to justify and support their reported results.

As for the rest of Java's epigraphers, we must wonder how many of their examinations need to be reviewed and revised, or, to pose the question in its corollary form, how many misreadings have been locked into print and thoughtlessly propagated without the hope of confirmation? On a recent occasion, I had reason to discuss the errors in the published readings of Mañjuśrīgṛha in some detail and cite work which examines some of the mis-

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takes in De Casparis's reading of Kayumwungan (Sundberg 2006), but these are not the only such mistakes in published readings that are known to me. Such mistakes would be less pernicious if adequate visual documentation of Javanese epigraphical material existed. In fact, today, such documentation can be easily performed on flat metal inscriptions by the use of a common flatbed scanner (see Schubert 2000 for an overview of the justification for this technique). With the technological development of the laser, a source of spectrally pure coherent light, adequate documentary techniques now also exist for the large and often irregularly shaped three-dimensional inscriptions as well. (See Demoli et al. 1994 for an application of laser interferometric techniques, with optical Fourier pattern discrimination, to ancient Near Eastern cuneiform tablets. Perhaps even more impressive is the Stanford computer science department's Large Statue Scanner, which under the directorship of Marc Levoy used laser ranging to scan the entirety of Michelangelo's David with a depth resolution of 0.1mm and a typical sample spacing of 0.29mm.) Even better in many instances will be the technique developed by Dimitrova et al. (2005), who demonstrated that sufficient amounts of the chisel's metal remain wedged in the stone to scatter and reradiate a spectrally filtered beam of X-rays from a synchrotron. The team was able to both analyse the metallic composition of the chisel and restore legibility to faded Greek inscriptions on marble. A combination of both topographic mapping and fluorescence of the metal would provide the best chances of recovering traces of the writing from a number of semi-legible inscriptions like the Plaosan inscription.

The advantages to epigraphers of having access to a collection of high-fidelity three-dimensional digital facsimiles of Javanese inscriptions are substantial. First, such a facsimile could be easily converted into a two-dimensional picture and serve as documentation to accompany any study of the inscription. In particular, a corpus of digital facsimiles would allow a much wider opportunity for university students of epigraphy to study such aspects as palaeography without necessitating long and expensive travel to the various sites where Java's inscriptions have ended up. Second, the technique of making digital facsimiles can be applied not only to existing inscriptions but also to existing estampages. As some inscriptions (such as large portions of the fractured Kayumwungan inscription) have been tragically lost, the only way to study them is to examine their estampages, which at present must be read backward. With a digital facsimile, the image can be trivially inverted and read in the proper manner. Third, such a facsimile would be an excellent means of archiving Indonesia's epigraphical heritage. Because such facsimiles are stored as numbers on a computer and can be copied with perfect fidelity, they are an excellent guarantee against the pitfalls of nature which might beset physical objects. In fact, three-dimensional duplication of inscriptions is possible using stereolithography. Such techniques may be used to restore

disjointed museum fragments – it is not impossible for all the known portions of the Kayumwungan inscription to again be on public display in the courtyard of the Indonesian National Museum, or for a complete copy of the Abhayagirivihāra inscription to be reconstituted even though the parts are split between Jakarta and Yogyakarta. Fourth, sophisticated digital signal processing algorithms can be employed on the facsimiles to remove pits and other signal noise on the stone, to deepen and tighten abraded lines, to remove visually distracting patches of discoloration and blemish, and even to magnify small writing. In general, digital enhancement may bring back substantial legibility to largely illegible inscriptions such as the large Plaosan inscription. Fifth, digital facsimiles would allow the detailed inspection, screenful by screenful, of large inscriptions such as Plaosan or the in situ boulder inscriptions of Hampran[1] or Gondosuli[2] which do not photograph well.

There is also a need for a professionally and institutionally maintained registry of Indonesia's inscriptions. We live in a modern age characterized by digital information storage, digital communications, and digital image processing. There is no sense being confined in an academic world no more technologically sophisticated than the one inhabited by Brandes or Sarkar. How many successive editions of these inscriptions have been committed to paper in an ephemeral and incomplete corpus, each edition outmoded by the time the ink is dry on the page by a new discovery of epigraphical material? There is thus a need for an institutionally maintained digital repository of inscriptions. This digital register should be available online with access to transcriptions, translations, facsimiles, photographs, and citations to previously published literature. This registry could easily allow modernized and searchable versions of Damais's 1970 *Répertoire onomastique* and Sarkar's appendices of names and titles, both of which are invaluable for research but now outdated by new epigraphical discoveries. Such a registry would greatly facilitate the preservation, documentation, and epigraphical study of Indonesia's classical heritage.

[1] Too few people have knowledge of the very important 750 inscription from near Salatiga. Only De Casparis who read the inscription, Damais who deciphered the date, and Nakada, whom local informants in 2000 recall as having spent a full day making a plaster cast of the inscription back in the early 1980s, seem to have a deeper acquaintance with even the palaeographic characteristics of this highly important inscription. It is something of a shame to De Casparis and Damais that the official plaque commemorating the inscription and providing both De Casparis's transcription and Damais's dating credits neither of these scholars with their work.

[2] The Gondosuli boulder inscription was seriously damaged by some Temanggung-area technical students who used an acid-based paper to make a facsimile. The estampage may now be the highest-fidelity version of the inscription.

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